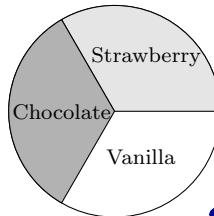


Worksheet 6: Fair Shares and Divider-Chooser

Tom and Fred were given a cake worth \$12 that is equal parts strawberry, vanilla and chocolate.



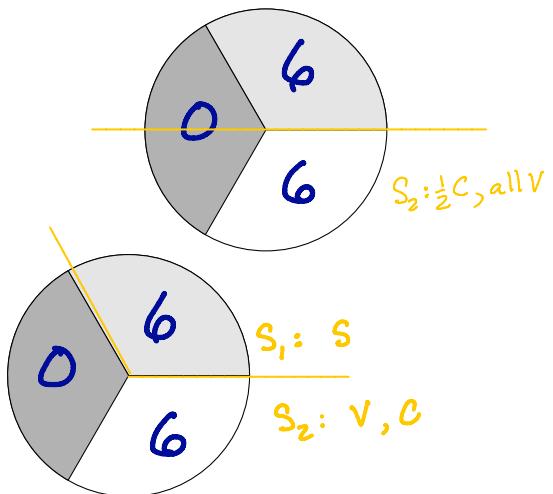
$$\$12/2 = \$6$$

1. How much value is a fair share of the cake? _____

2. Tom likes vanilla and strawberry equally, and doesn't like chocolate at all. Label the cake parts as you answer the following:

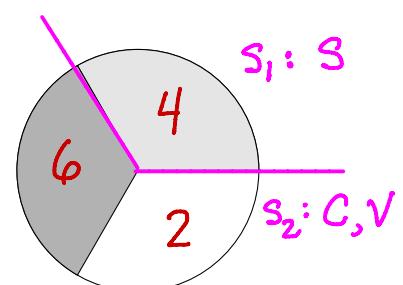
$$S_1: \frac{1}{2}C, \text{ all } S$$

- How much does Tom value the vanilla section of the cake? \$6
- How much does Tom value the chocolate section of the cake? \$0
- How much does Tom value the strawberry section of the cake? \$6
- Find (and draw) two *different* ways Tom could split the cake into two pieces of equal value.

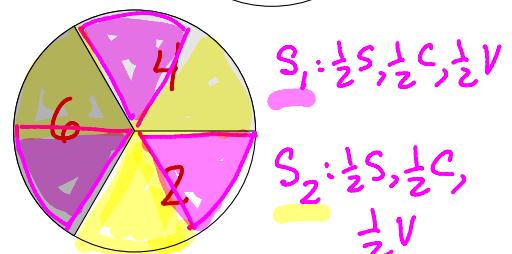


3. Fred will eat vanilla, but he likes strawberry twice as much as vanilla and he likes chocolate *three* times as much as vanilla. Label the cake parts.

$$S_1: S$$



- How much does Fred value the vanilla section of the cake? 2
- How much does Fred value the chocolate section of the cake? 6
- How much does Fred value the strawberry section of the cake? 4
- Find (and draw) two *different* ways Tom could split the cake into two pieces of equal value.

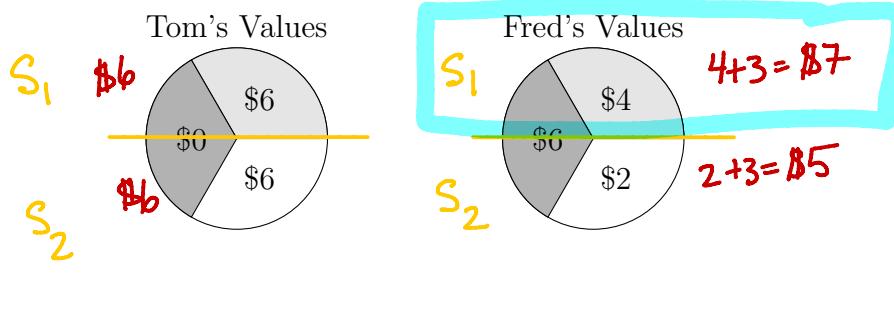


You are going to demonstrate how to divide the cake between Tom and Fred using the Divider-Chooser Method.

Steps:

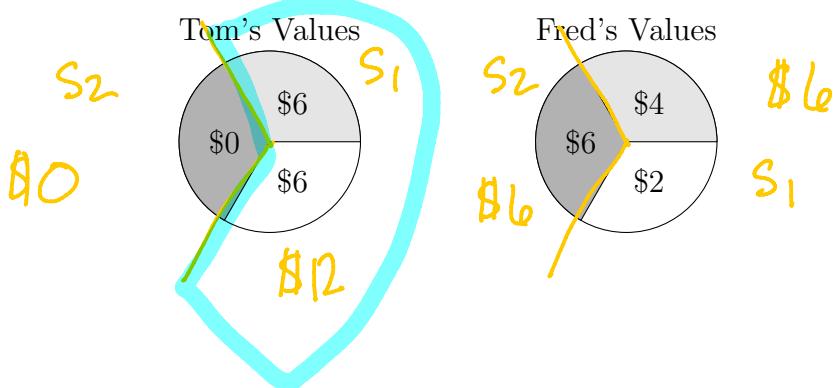
- (1) Divide the cake into two pieces of equal value according to the **Divider's** values. (Label these two pieces in both pictures).
- (2) Determine which piece the **Chooser** will select according to their values.
- (3) Assign the remaining piece to the **Divider**.
- (4) Calculate the value of the final outcome for each person.

4. Divider: Tom; Chooser: Fred.



	Tom	Fred
Share piece	S2	S1
value	\$6	\$7

5. Chooser: Tom Divider: Fred;



	Tom	Fred
Share piece	S1	S2
value	\$12	\$6

6. Is it better to be the divider or chooser in this case? Why?

Better to be the chooser! You are guaranteed at least $\frac{1}{2}$, but maybe more. The divider always gets $\frac{1}{2}$ exactly.

7. Challenge: Suppose that another friend, Janet, likes vanilla 3 times as much as she likes strawberry and chocolate, which she likes equally. How much does she value each of the three pieces?

Strawberry \$2.40 Vanilla \$7.20 Chocolate \$2.40

$$\begin{aligned}
 x &= \text{value of } S \text{ or } C \\
 3x + 2x &= 12 \\
 5x &= 12 \\
 x &= \frac{12}{5} = \$2.40
 \end{aligned}$$

3x = value of V

